Two new species of Chalcosiinae from South East Asia (Lepidoptera: Zygaenidae)

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Abstract: Two new Chalcosiinae (Zygaenidae) are described from South East Asia, viz. *Eumorphiopais* ***inouei*** **sp. n.** from N Thailand (holotype male in Tiroler Landesmusem Ferdinandeum, Innsbruck) and *Pseudarbudas* ***efetovi*** **sp. n.** from NE India (Khasia Hills) (holotype male in The Natural History Museum, London).

Zwei neue Chalcosiinae-Arten aus Südostasien (Lepidoptera: Zygaenidae)

Zusammenfassung: Zwei neue Chalcosiinae (Zygaenidae) aus Südostasien werden beschrieben, *Eumorphiopais* ***inouei*** **sp. n.** aus Nordthailand (Holotypus Männchen im Tiroler Landesmusem Ferdinandeum, Innsbruck) und *Pseudarbudas* ***efetovi*** **sp. n.** aus Nordostindien (Khasi-Berge) (Holotypus Männchen in The Natural History Museum, London).

Introduction

For more than ten years the author has been hesitating to describe two new Zygaenidae (Chalcosiinae) species from South East Asia, which he had found when working with material in the Natural History Museum in London. Only one single specimen of each was available.

Based on a revision of the former *Arbudas*-complex that initially included the genera *Arbudas* Moore, 1879, *Eumorphiopais* Hering, 1922, *Pseudarbudas* Tarmann, 1992, and *Heteropanula* Tarmann, 1992 (Tarmann 1992), there was no doubt that these two specimens were new for science as they could not be assigned to any taxon described so far. Nevertheless, there was still some hope to find more material somewhere.

Recently a series of ♂ specimens of one of the two species was collected by K. Černý (Innsbruck, Austria) in northern Thailand. This material was donated to the museum in Innsbruck. Moreover, this species is already figured in Endo & Kishida (1999: 71, fig. 21) but under the wrong name *"Eumorphiopais leis*". To avoid further confusion both above-mentioned new species are now described.

All photos of paintings, specimens and genitalia are made with layer photography by S. Heim (Innsbruck, Austria).

Depositories of material and abbreviations

BMNH	The Natural History Museum, London (formerly British Museum (Natural History)), U.K.
fw.	forewing[s].
GP	genitalia preparation/dissection/slide no.
HT	holotype.
hw.	hindwing[s].
PLT	paralectotype.
PT	paratype.
TLMF	Tiroler Landesmuseen, Ferdinandeum, Naturwissenschaftliche Sammlungen, Innsbruck, Austria.
GMT	Gerhard M. Tarmann.
uns.	underside.
ups.	upperside.

Descriptions

Eumorphiopais ***inouei*** **sp. n.**

(Figs. 1, 3–6)

Holotype ♂: Thailand, Lampang, Chiang Rai, 1090 m, road 1150, km 17 from Wiang Pa Pao, 27. v. 2011 (K. Černý) (TLMF) (Figs. 3–5).

Paratypes (in total 7 ♂♂): Thailand, 6 ♂♂, same data as HT (TLMF). 1 ♂ (Fig. 1), Province Chiang Mai, Chiang Mai W, Doi Suthep, 8.–10. vii. 1966 (H. Inoue) (BMNH) (Figs. 1, 6, 12–14).

Note: 1 ♂ from "N. Laos" is figured in Endo & Kishida (1999: 71, fig. 21) (as *Eumorphiopais leis*).

Derivatio nominis: This new species is named in honour of the late Hiroshi Inoue, Japan, who was one of the leading Asian scientists working on Zygaenidae and who discovered the first specimen of this new species. The specimen from Doi Suthep, Chiang Mai, had been separated in Inoue's collection in the BMNH, obviously by himself. This indicates that Inoue may have already recognized it as an undescribed species but hesitated (like the present author) to base a description on one single and slightly worn specimen.

Description

♂ (n = 8).

Length of body: 11.2–12.0 mm; length of fw.: 14.9–16.0 mm; breadth of fw.: 7.5–9.0 mm; length of hw.: 11.9–13.0 mm; breadth of hw.: male 8.2–10.0 mm; length of antenna: 7.0–7.4 mm.

Head, thorax and ups. of abdomen thickly covered with dark olive green scales with a pronounced sheen; shiny bluish scales are scattered within the green scales, especially on head and collar and at the base of the abdomen, uns. of abdomen whitish.

Frons and vertex bluish green. Antenna bipectinate, bluntly pointed, shaft thickly covered with dark olive green scales, length of pectinations in middle part of antenna 0.6 mm, pectinations tapering towards apex; number of segments 66–68. Proboscis dark brown, labial palps whitish cream.

Patagia, tegulae and thorax shiny olive green, in some specimens (but not in all) strongly tinged with blue. Fw. ups. uniform dark olive green, with distinct sheen; fringe concolorous, except for a short white part posterior of apex where the wing is slightly emarginate (Fig. 5) (a typical character of the genus *Eumorphiopais*) (this

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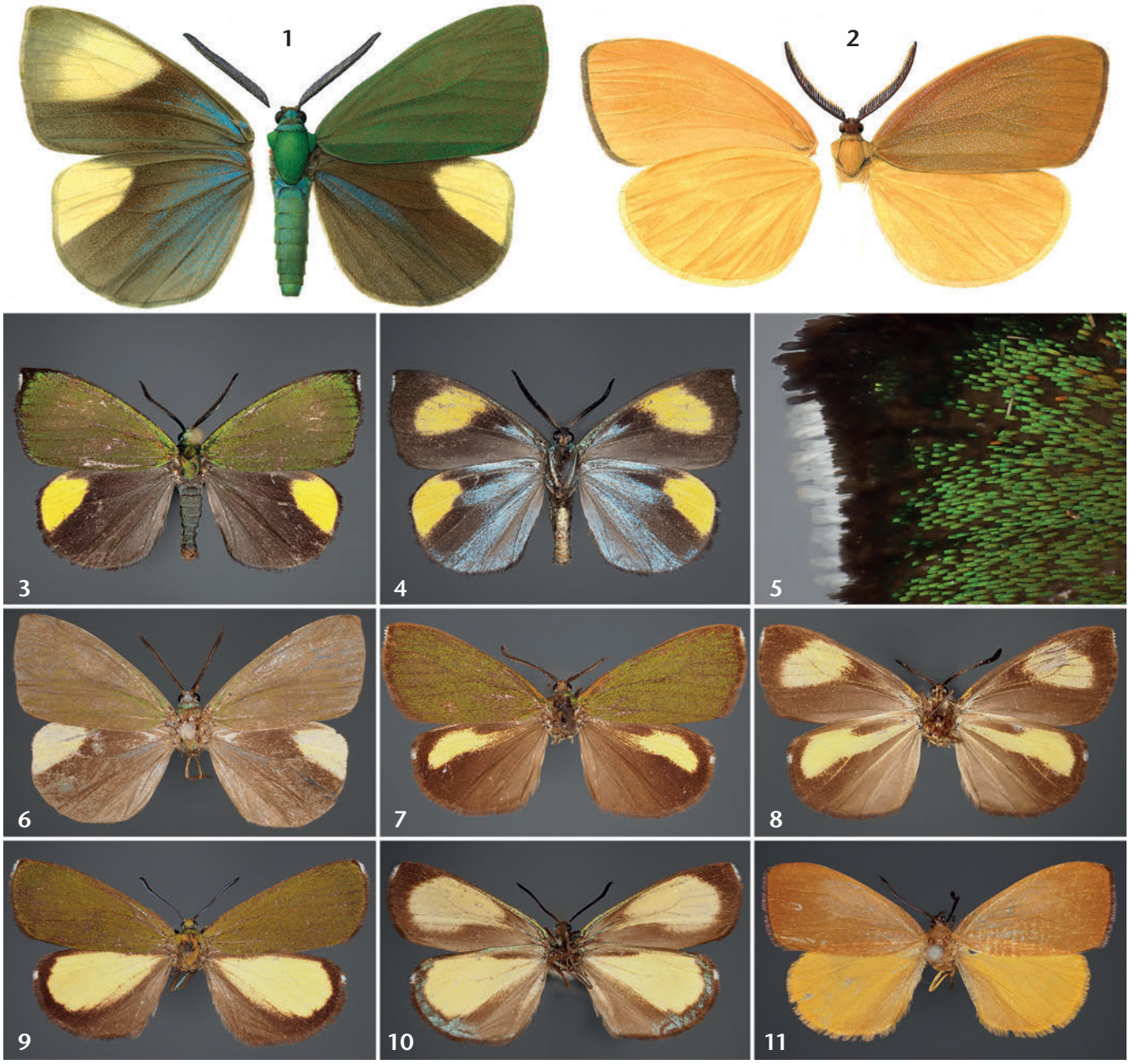

Fig. 1: *Eumorphiopais inouei* sp. n., PT ♂, right ups., left uns. Thailand, Doi Suthep, 8.–10. VII. 1966 (H. INOUE) (BMNH). Painting by F. GREGOR, Brno, Czech Republic. This painting was based on INOUE's specimen from 1966 (Fig. 6) and drawn by the artist in 1995. The specimen figured is slightly worn. Therefore the colours tend more to brown than to shiny olive green on the fw. and also the bluish sheen is less strong than in the fresh specimens taken by K. ČERNÝ in 2011. Moreover, the white half-moon-shaped part of the fringe on the fw. is missing. — **Fig. 2:** *Pseudarbudas efetovi* sp. n., HT ♂, right ups., left uns. India, Khasia Hills (native collector) (BMNH). Painting by F. GREGOR, 2000. — **Figs. 3–6:** *Eumorphiopais inouei* sp. n. **Figs. 3–5:** HT ♂, Thailand, Wiang Pa Pao, 27. v. 2011 (K. ČERNÝ) (TLMF). **Fig. 3:** ups., **Fig. 4:** uns., **Fig 5:** ups., wing detail. **Fig. 6:** PT ♂, ups. — **Fig. 7–10:** *Eumorphiopais leis* (SWINHOE, 1894), India, Khasia Hills (native collector) (TLMF). **Figs. 7–8:** ♂; **Fig. 7** ups., **Fig. 8** uns. **Figs. 9–10:** ♀; **Fig. 9** ups., **Fig. 10** uns. — **Fig. 11:** *Pseudarbudas ochrea* (ELWES, 1890), ♀, ups. India, Assam, Naga Hills, 5000–7000 ft., VIII.–IX. 1889 (W. DOHERTY) (TLMF). — Specimens not to the same scale; for sizes see description in text.

character is lacking in worn specimens, see Fig. 1); fw. uns. dark grey, with a large oval yellow patch close to apex (similar as in hw. but not reaching the fringe) and with shiny bluish scales proximally. Hw. ups. dark grey in fresh specimens, brownish in worn specimens, with a triangular yellow patch at apex, fringe concolorous with the exception of a few white scales distad of cell which are absent in worn specimens; hw. uns. like ups. but with many more shiny blue scales that cover almost the whole proximal and anal part of the wing; fringe dark grey with a few white scales posterior of apex. Legs dark brown, covered with shiny bluish scales, tibia without epiphysis, mid and hind tibia with two very short spurs. The androconial organ (sensu TARMANN 1992, YEN 2003, YEN et al. 2005) is short but well visible.

Genitalia ♂ (Figs. 12–17). Uncus broad, helmet-shaped, strongly sclerotised, double-lobed, with strong distal emargination, setae-bearing humps (a generic character of *Eumorphiopais* TARMANN, 1992) close to each other. Aedeagus straight or slightly curved, with a peculiar, pocket-shaped insertion of the ductus seminalis at proximal end, with one short straight cornutus.

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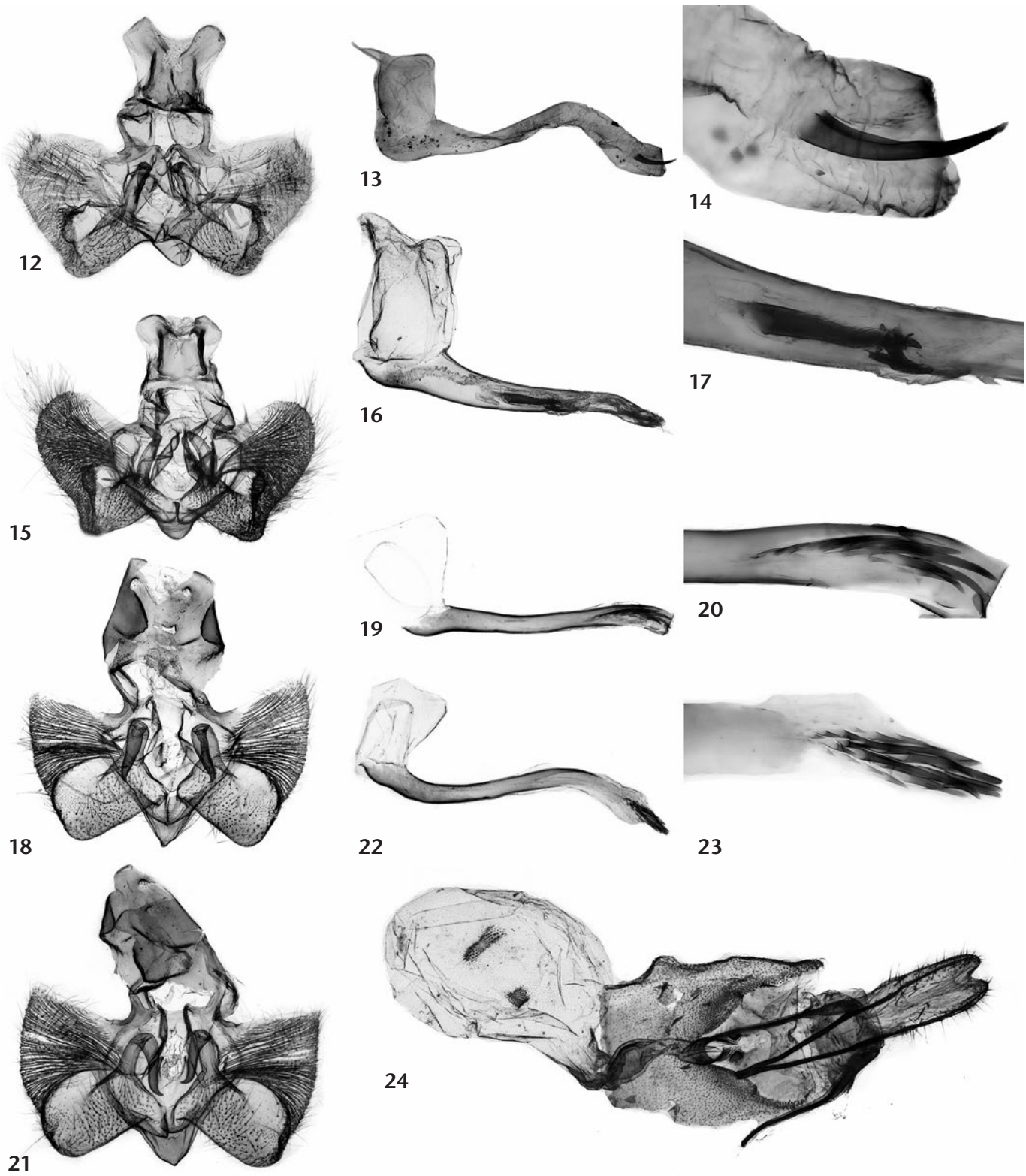

Figs. 12–24: Genitalia morphology of *Eumorphiopais* species. — **Figs. 12–17:** *Eumorphiopais inouei* sp. n. **Figs. 12–14:** PT ♂, Thailand, Doi Suthep, 8.–10. VII. 1966 (H. INOUE) (BMNH), GP Z 3175 (GMT). **Fig. 12:** genitalia, uncus, valvae, vinculum; **Fig. 13:** aedeagus; **Fig. 14:** cornutus in detail. **Figs. 15–17:** PT ♂, Thailand, Wiang Pa Pao, 27. v. 2011 (K. ČERNÝ) (TLMF) GP Z 3547 (GMT). **Fig. 15:** genitalia, uncus, valvae, vinculum; **Fig. 16:** aedeagus; **Fig. 17:** cornutus in detail. — **Figs. 18–24:** *Eumorphiopais leis* (SWINHOE, 1894). **Figs. 18–20:** ♂, India, Assam, Cherrapunji, VII. 1893 (native collector), (TLMF), GP Z 2345 (GMT). **Fig. 18:** uncus, valvae, vinculum; **Fig. 19:** aedeagus; **Fig. 20:** cornutus in detail. **Figs. 21–23:** ♂, India, Khasia Hills (native collector), (TLMF), GP Z 2346 (GMT). **Fig. 21:** uncus, valvae, vinculum; **Fig. 22:** aedeagus; **Fig. 23:** cornutus in detail. **Fig. 24:** ♀, India, Khasia Hills (native collector), (TLMF), GP Z 2347 (GMT).

Differential diagnosis

Eumorphiopais inouei sp. n. is similar to *Eumorphiopais leis* (SWINHOE, 1894) in colour and wing pattern but the yellow parts have a significantly different shape (see Figs. 1, 3, 7). Moreover, *E. inouei* sp. n. has a more intensive shiny bluish uns. and the shiny scales are arranged at the proximal part of the wing and not at the distal parts as in *E. leis* (see Figs. 4, 8, 10). In the male genitalia the uncus is more slender in *E. inouei* sp. n. and the distal end is emarginated and not almost straight, the setae-bearings

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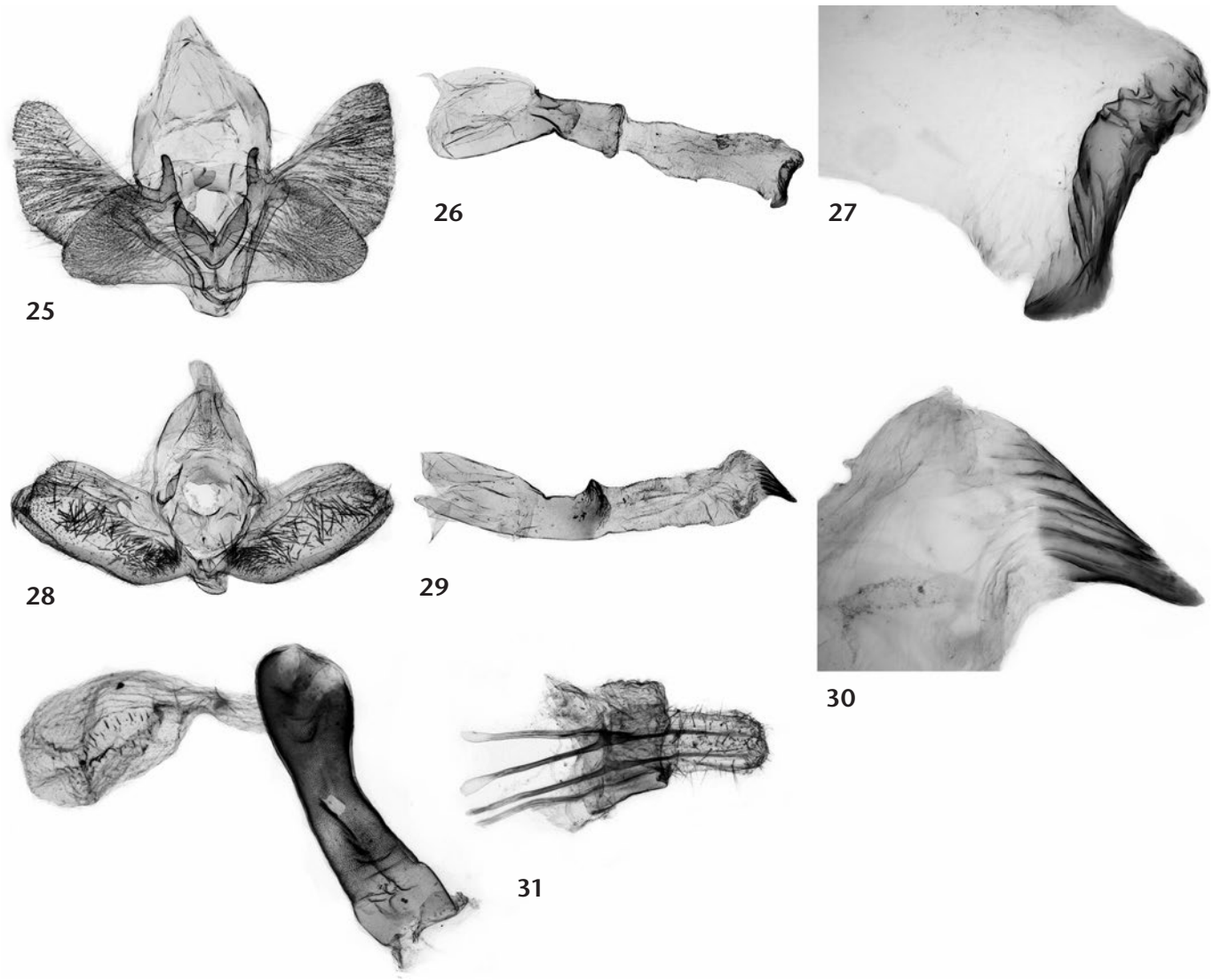

Figs. 25–31: Genitalia morphology of *Pseudarbudas* species. — **Figs. 25–27:** *Pseudarbudas efetovi* sp. n., holotype ♂. **Fig. 25:** genitalia, uncus, valvae, vinculum; **Fig. 26:** aedeagus; **Fig. 27:** cornutus in detail. — **Figs. 28–31:** *Pseudarbudas ochrea* (Elwes, 1890). **Figs. 28–30:** PLT ♂, India, Assam, Naga Hills, 5000–7000 ft., viii.–ix. 1889 (W. Doherty), (BMNH), GP Zyg. 1640 (BMNH). **Fig. 28:** genitalia, uncus, valvae, vinculum; **Fig. 29:** aedeagus; **Fig. 30:** cornutus in detail. **Fig. 31:** PLT ♀, genitalia. India, Assam, Naga Hills, 5000–7000 ft., viii.–ix. 1889 (W. Doherty), (TLMF). GP Z 2362 (GMT).

humps are closer together in *E. inouei* sp. n. than in *E. leis*. Aedeagus with one cornutus in *E. inouei* sp. n. but with a bundle of cornuti in *Eumorphiopais leis* (see Figs. 14, 17, 20, 23).

Biology

Unknown. The 7 ♂♂ from Chiang Rai were obtained at light.

Distribution

So far only known from northern Thailand and northern Laos.

Pseudarbudas efetovi sp. n.

(Figs. 2, 25–27)

Holotype ♂ (Fig. 2), India, Khasia Hills (native collector) (BMNH). — No paratypes.

Derivatio nominis: This species is named in honour of my dear friend Prof. Dr. Konstantin A. Efetov (Simferopol, Ukraine), who is one of the leading scientists working on Zygaenidae.

Description

♂.

Length of body: 9.0 mm; length of fw.: 14.0 mm, breadth of fw.: 7.4 mm; length of hw.: 11.5 mm, breadth of hw.: 7.4 mm; length of antenna: 5.8 mm.

Head dark brown antero-dorsally, yellow ventrally, compound eyes black, chaetosema yellow; antenna bipectinate, blackish brown, yellow at tips of pectinations, with 37 segments. Thorax and abdomen yellowish brown on ups., yellow on uns., legs yellow, partly brown laterally; fw. ups. uniform ochreous, covered with scattered white scales at the proximal two-thirds of wing, fringe short, brown, uns. of fw. yellow, fringe brown, hw. upper- and uns. yellow, fringe yellow.

Genitalia ♂ (Figs. 25–27). Uncus single, translucent, with a pair of lateral setae-fields basally where the uncus is fused with the broad, round and also not strongly sclerotised tegumen; vinculum rounded, without a distinct saccus; valva short, stout, triangular dorsally,

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almost pointed distally, translucent and strongly folded, less folded and shorter ventrally, without a stronger sclerotised marginal part, at the inner dorsal margin of the ventral part of the valve there is a prominent, finger-like, upwards pointing process developed, the ventral part of the valve covered with short, triangular spines distally, with longer setae centrally and almost without setae or spines proximally; aedeagus straight, short and stout, more strongly sclerotised distally, the everted vesica approximately of the same length as the aedeagus, with one prominent cornutus of characteristic shape distally. Eighth tergite of abdomen translucent, with stronger sclerotised caudal margin.

Differential diagnosis

Externally extremely similar but slightly larger than *Pseudarbudas ochrea* (Elwes, 1890) (Fig. 11). The valva is longer, more slender and rounded in *P. ochrea*, the dorsal process on the ventral part of the valva is placed differently, is much shorter, stronger sclerotised and strongly curved inwardly, the spines at the ventral part of the valve are concentrated proximally (Figs. 25, 28). The aedeagus is similar in shape in both species (Figs. 26, 29) but the cornuti are different. In *P. ochrea* the cornutus is shark-tooth shaped but consists of many small cornuti whereas *P. efetovi* sp. n. has a band-like and slightly curved cornutus with distal dentations (Figs. 27, 30).

Biology

Unknown.

Distribution

So far only the holotype is known.

Acknowledgements

I am indebted to Dr. K. Černý (Innsbruck, Austria) for the donation of valuable material from Thailand, which stimulated me to write this paper. I thank Dr. W. G. Tremewan (Truro, U.K.) for commenting on an earlier draft of this paper and for editing the English text. M. R. Honey (BMNH, London, U.K.) is thanked for continuous help and for providing access to the collections of the Natural History Museum (BMNH) in London. I also thank Dr. F. Gregor (Brno, Czech Republic) for painting the two species in the years 1995 and 2000. Last but not least I thank my colleague S. Heim (Tiroler Landesmuseen, Naturwissenschaftliche Sammlungen, Innsbruck, Austria) for the excellent photographic work.

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Received: 13. ix. 2011

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